

REMARKS

Claims 1-6, 8-13, 15-21 and 23 are pending in the application. No claims are amended herein.

Applicants respectfully submit that the cited references and combinations fail to disclose all of the limitations of Applicants' claims and thereby Applicants' claims are respectfully submitted to fully patentably to distinguish over the asserted combinations of prior art references.

For at least the reasons which follow, Applicants respectfully request reconsideration of the application, withdrawal of the asserted objections and rejections, and allowance of the claims.

Rejection under 35 U.S.C. §103 over Switkes et al., Wallace and Constantini.

Claims 1-6, 8-13, 15-21 and 23 stand rejected as obvious over the asserted combination of Switkes et al. ("Immersion Lithography at 157 nm"), Wallace, U.S. Patent No. 6,024,801 and Costantini et al., U.S. Patent No. 6,612,317. Applicants respectfully traverse the rejection of the claims for the following reasons.

Costantini et al. fails to disclose or suggest recovery and purification of the immersion lithography medium from the mixture, as claimed. Applicants respectfully submit that the Examiner's reading of Costantini et al. is incorrect to the extent the Examiner contends that the teachings are applicable to an immersion lithography fluid as claimed. The co-solvent used by Costantini et al. is not the same as Applicants' immersion lithography fluid, and the process of Costantini et al. applied to the co-solvent cannot be applied to an immersion fluid as claimed. The only portion of the material removed from the Costantini et al. process that even approximately corresponds to Applicants' immersion lithography fluid is the "waste" referred to, for example, at col. 6, line 57. At this point, with respect to the further handling of this waste, the process of Costantini et al. is at a dead end. To contend otherwise is to extrapolate the teachings of Costantini et al. far beyond any fair reading thereof.

Accordingly, Applicants respectfully submit that there is no *prima facie* case of obviousness here, since all the limitations of the claims have not been disclosed or even fairly suggested by the asserted assemblage of Switkes et al., Wallace, and Costantini et al. Applicants reiterate their request for reconsideration and withdrawal of the rejections.

Costantini discloses use and recovery of a co-solvent, not of an immersion lithography fluid. There is no disclosure in Costantini teaching or suggesting the use of an immersion lithography fluid, and therefore there cannot be any teaching or suggestion that such a fluid could be recovered and recycled. Costantini discloses supercritical phase cleaning and processing of semiconductor wafers as for removal of solvents, photo-resist materials, and loose particulate matter. Col. 1, lines 13-15. But, Costantini does not disclose recovery and purification for re-use of anything but the co-solvent. Costantini teaches the other materials are "waste". See, e.g., col. 6, line 55-56 and col. 10, lines 30-31.

If the Costantini et al. co-solvent were the same as Applicants' immersion lithography fluid, the immersion lithography fluid would only be provided to the wafer together with the super-critical fluid, not for use in immersion lithography as claimed. This is not anything like what Applicants disclose and claim. Applicants' claims cannot be fairly read upon or alleged to have been rendered obvious by such a different material used in such a different way at a different time in the process. In Applicants' disclosed and claimed process, the immersion lithography fluid is provided for use in immersion lithography, and then it, together with any other waste materials, is removed by the supercritical carbon dioxide and optional co-solvent. While a co-solvent may obviously be combined with the supercritical carbon dioxide and, as disclosed by Costantini et al., both the carbon dioxide and the co-solvent can be recovered and reused, this is not at all the same as, and cannot reasonably be contended to have rendered obvious, what Applicants have disclosed and claimed in the immersion lithography process.

There is nothing in Costantini et al. or the other cited references that would even suggest what Applicants have claimed in the present application.

Regarding the process at the point where the supercritical carbon dioxide and any co-solvent have been applied to the wafer and passed into the recovery section, Costantini discloses, at col. 6, lines 11-13:

The recovered solvent or mixture may contain suspended or dissolved components from process chamber 37, and is now called "effluent".

The carbon dioxide, any co-solvent, any debris from the process and the immersion lithography fluid would be included in the "effluent".

Costantini et al. discloses, at col. 6, lines 27-34:

Under the temperature and pressure conditions just described, the effluent separates into a vapor phase and a liquid phase.

The vapor phase contains the gas or gas mixture originally supplied by feed pump 23, and a small fraction of co-solvent or dissolved liquid or solid from the wafer in process chamber 37, based on its solubility in the gas under the conditions in the separator.

Thus, the carbon dioxide and, possibly, a small amount of other materials, are in the vapor phase. As disclosed by Costantini et al. at col. 6, lines 40-44:

The liquid phase contains the co-solvent and any dissolved or suspended components removed in process chamber 37, and a small fraction of gas, based on the solubility of the gas in the co-solvent, under the conditions in the separator.

The immersion lithography fluid clearly would be included in this liquid phase.

As disclosed by Costantini et al. at col. 6, lines 40-44:

The liquid phase passes into separator 61, monitored by level transmitter 79, temperature transmitter 60, and heated by heater 62. Heater 62 heats the liquid phase to boiling at atmospheric pressure, to provide for separation into a vapor-phase containing the co-solvent, at suitable purity to be re-used in the process previously described, and a liquid-phase containing any remaining contamination, and sufficient liquid, if any, needed to maintain a fluid state. The liquid phase is now called waste.

Here it is quite clear that the immersion lithography fluid would be included in the "liquid-phase containing any remaining contamination" which is then designated as "waste". There is no suggestion that anything other than the co-solvent could be in the vapor phase.

It is most noteworthy that only the co-solvent is removed at "suitable purity to be re-used in the process". The closest that Costantini et al. comes to any possible re-use of the "waste" is at col. 6, lines 57-62:

The waste is discharged as needed through isolation valves 64 and 63 to holding tank 65, which is cooled by chiller 66 and monitored by temperature transmitter 71 to ambient conditions. Tank 65 is removed for disposal or recovery of its contents as needed by closing isolation valves 63 and 64 and disconnecting the line between them.

Any fair and appropriate reading of this disclosure would suggest, at best, that components of the waste that are not acceptable for disposal, e.g., for environmental reasons, should be recovered. At this point, with respect to any further handling of this waste, the process of Costantini et al. has reached a dead end. There is not one word to suggest that any "waste" component should or could be recovered, purified and reused, and there is not one word to suggest that any component of the waste or any other part of the Costantini et al. process could possibly include an immersion lithography fluid. Finally, there is not one word in Costantini et al., except possibly in hindsight, to suggest that any component of the process could include an immersion lithography fluid that could be purified for re-use.

For these reasons, Applicants respectfully submit that there is and can be stated no *prima facie* case of obviousness of Applicants' claimed invention.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejections of Applicants' presently pending claims over Switkes et al., Wallace and Costantini et al.

Applicants respectfully submit that all of the presently pending claims patentably distinguish over the cited references. Applicants respectfully request the Examiner to withdraw the rejection of the claims.

CONCLUSION

For the foregoing reasons, Applicants respectfully submit that all of the presently pending claims patentably distinguish over the prior art generally, and over Switkes et al., Wallace and Costantini et al., and that all of Applicants' claims are therefore in condition for allowance. Applicants request the Examiner to so indicate.

If the Examiner considers that a telephone interview would be helpful to facilitate favorable prosecution of this application, the Examiner is invited to telephone the undersigned.

If any additional fees are required for the filing of this paper, please charge the fee to Deposit Account No. 18-0988, Order No. H1559 (AMDSPH1559).

Respectfully submitted,
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